tached from each other, so that it is difficult to get flawless boards."

In 1912 the writer found the older mesquite trees in the vicinity of San Antonio, Texas, seriously affected by a trunk disease, caused by one of the polyporous fungi. In one small field some twenty or more trees were found bearing the fruiting bodies of this fungus. Its distribution in the vicinity of San Antonio was general, and it is probable that it extends over a wider range, as evidenced by the finding of a sporophore by Underwood in the vicinity of Austin, in 1891.

Where the mesquite develops into a bush with several trunks, sometimes only one of the several trunks is affected, but in other cases several or all of them contract the disease. The age of the affected trees was difficult to estimate. The mesquite grows rather rapidly at first, but very slowly after eight or ten years. According to Sargent, trunks thirty years old may be seven to eight inches in diameter, while trees one foot in diameter are probably over one hundred years old. The trees found affected were from two to ten inches in diameter and all over twenty years of age, some of them probably very much older.

The decay is confined entirely to the heart-wood of the main trunks, extending from the ground up into the trunk for varying distances. The distribution is such that it is obvious that the fungus gains entrance through wounds in the trunk above the ground, chiefly through old branch stubs and borer holes, as is so frequently the case with trunk diseases of this kind. One instance was found which made it appear obvious that the holes made by the borer had served to give the fungus a start.

Sections of diseased trunks showed that the heart-wood was decayed to a greater or less degree (pl. 6 fig. 2). Mesquite wood has very sharply defined heart and sap-wood. The latter is light yellow or almost white and very narrow, being composed of but a few rings of wood, whereas the heart-wood is rich brown or reddish. The decay of the heart-wood begins near the center, and gradually spreads outward towards the bark; there is very little, if any, change in color (except that the decayed wood is a lighter shade of brown), and here and there irregular, thin lines of undecayed wood can be seen extending through the diseased

part. The decayed wood is very brittle, but still remains fibrous, that is, it does not crumble into powder like charcoal. It splits like sound wood, but is spongy and soft. The wood of the mesquite is very hard and heavy, a cubic foot weighing 47.69 pounds when absolutely dry. It consists of numerous, distinct medullary rays, and distinct but irregularly distributed bands of very thick-walled wood fibers, between which occurs a thinner-celled wood parenchyma. In the heart-wood the lumina of the cells of the latter tissue are usually completely filled with a yellow-brown substance, largely composed of tannin. McMurtree (8) found tannic acid in large quantities in mesquite wood, 6.21 per cent in the heart-wood, 0.5 per cent in the sap-wood, and 0.5 per cent in the bark. Besides tannin he found of materials other than tannin, insoluble in water but extracted by ether, 0.6 per cent in the heart-wood, 6.7 per cent in the sap-wood, and 1.84 per cent in the bark. A considerable number of large, open ducts are found in the early part of each wood ring. These also are filled with a yellow-brown substance similar to that found in the wood parenchyma.

The fine, colorless mycelium of the fungus spreads throughout the wood substance. Unlike *Polyporus rimosus* in locust wood (10), the fungus does not destroy the wood as a whole, but attacks only the heavily lignified groups of wood fibers. These are wholly destroyed, leaving holes or gaps between the vessels and wood parenchyma. The dissolution of the wood fibers evidently proceeds with great rapidity, starting with the secondary thickening of each cell. The cells disappear entirely, and in advanced stages of decay small masses of mycelium are the only evidence of their former presence. Although the wood parenchyma and the vessels are filled with hyphæ, they resist destruction almost completely,—a fact which may be connected with the very high tannin content of both of these tissues. The recent results of Wehmer (11), who found that for certain species of fungi tannin exerts a retarding influence on development, and the similar findings of Knudson (7), and of Cook and Taubenhaus (3), who state that "tannin has a tendency to retard or inhibit the growth of fungi," and that "the parasitic forms are more sensitive to the action of tannin than the saprophytic forms," lend support to this idea. Cook and Taubenhaus

also found that for the parasitic fungi tested, concentrations of from 0.1 per cent to 0.6 per cent were sufficient to retard growth. While the mere presence of considerable tannin may not entirely prevent the development of a fungus, it may retard its growth, and in the mesquite may explain the comparative immunity of the wood parenchyma to its attacks. The selective destruction of the wood fibers will serve to distinguish this form of decay from the other types of hardwood decay.

From the material found it was not possible to judge of the ultimate stages of the disease. In view of the fact, however, that sporophores four years old were observed, it seems that the resistance of a part of the wood structure is more or less permanent. No mesquite trees were found broken off as a result of the action of the fungus. It is conceivable, however, that very severe storms might break off trees weakened by the disease.

The fungus which causes the decay is *Polyporus texanus* (Murrill) Sacc. & Trott. The sporophores, which are annual and very distinct and easily recognized, develop around old knots. At the end of one year the sporophore dries and cracks (pl. 6 fig. 1, and pl. 7 figs. 1, 2), and many of them become badly eaten by insects. The latter may completely destroy the fruiting structure, thereby preventing the formation of new pilei from the original one. The sporophores occur either singly or in groups. In the latter case the oldest sporophore of the group is situated near the trunk, and gives rise during the second year to another pileus; from the latter a third one may grow out during the following year. This habit is well shown in pl. 6 fig. 1, and in pl. 7 fig. 1. The photograph reproduced in pl. 6 fig. 1 shows a group of three sporophores from below; the oldest one (in the back), dried and cracked; the second one formed immediately below the oldest one; and the youngest one developed at the side. This condition is also evident in pl. 7 figs. 1, 2. On the trees observed there was usually only one sporophore or a single group of sporophores, and while the internal decay extended in some cases for ten to twelve feet up and down in the trunk, in no case did the sporophores develop at more than one point.

Polyporus texanus (Murrill) Sacc. & Trott., was first described by Murrill (9) in 1904 from a specimen collected by Under-

wood on a mesquite (?) tree near Austin, Texas, in 1891. Murrill's description of this fungus is as follows:

"Pileus ungulate, attached by the vertex, 3 x 5 x 4 cm., surface fulvous to fuliginous, concentrically and radially rimose, especially in age, the separated areas imbricated; margin very obtuse, concolorous, context corky, concentrically banded, fulvous to umbrinous, very thin, only one-tenth the length of the tubes in thickness; tubes 3 cm. long, 2–3 to a mm., tawny chestnut, polygonal, edges thin, entire; spores ovoid, smooth, very dark brown, 1–2 guttulate, 8 x 10μ."

While this description was made from one specimen, the characterization is a good one and well defines the sporophores recently collected, and now in the herbarium of the Missouri Botanical Garden. One of the marked characters of the fruiting structure is the concentrically and radially rimose surface (pl. 7 figs. 1, 2) with imbricated areas, particularly in the older specimens. The tubes are very long, 2–3$\frac{1}{2}$ cm. (as stated by Murrill), and make up the larger part of the mass of the sporophore. The largest specimen found measured 9.5 cm. in width, 7 cm. in length, and 5 cm. in thickness. Using Ridgeway's color scale, the top is avellaneous gray, the tubes tawny, the substance antique brown (umbrinus of Saccardo's scale); near the margin the color is verona brown to warm sepia. Murrill's statement that the sporophore is attached by the vertex should be amplified, as many of the sporophores are practically dimidiate. With the additional material now available for study, the modified description of the fungus in question is as follows:

Polyporus texanus (Murrill) Sacc. & Trott. Syll. Fung. **21**: 272. 1912.

Inonotus texanus Murrill, Bull. Torr. Bot. Club **31**: 597. 1905.

Pileus ungulate, attached by the vertex or dimidiate, 4–9.5 cm. wide, 3–7 cm. long, and 4–5 cm. thick; surface avellaneous gray to fulvous, concentrically and radially rimose, especially in age, the separated areas imbricated; margin very obtuse, verona brown to warm sepia; context corky, concentrically banded, antique brown, very thin, only one-tenth the length of the tubes in thickness; tubes 2–3$\frac{1}{3}$ cm. long, 2–3 to a mm., tawny, polygonal, edges thin, entire; spores ovoid, smooth, very dark brown, 1–2 guttulate, 8 x 10 μ. Parasitic on living mesquite trees.

In the same locality in which *Polyporus texanus* occurred, one mesquite tree was found bearing a sporophore of *Fomes rimosus* Berk. This fungus causes the heart rot of *Robinia Pseudo-Acacia* (10), and it is of interest to note its occurrence on a new host. The specimen found is a typical sporophore of *Fomes rimosus*, measuring about two inches in length; unfortunately it was not recognized at the time of collection, and sections of the affected tree were therefore not made. In view of the destructive character of this fungus when found on *Robinia*, however, it is probable that it causes a similar heart rot of the mesquite. Further search will be made in the San Antonio region for additional evidences of its occurrence.

The wood of the mesquite is usually described as being very resistant to decay after it has been cut from the tree. For many years mesquite posts have been used in the southwest in preference to other kinds. Mesquite ties, foundation posts, etc., have also proved that the wood is very resistant to decay. This applies only to the heart-wood, however. The sap-wood is very short-lived, and where small trunks are cut, as is now frequently the case, and used for fence posts, the length of life is very short, —sometimes not over two to three years. The destruction of the sap-wood is due to a number of insects and saprophytic fungi, all of which are common on dead branches, posts, etc., in the vicinity of San Antonio. Of the more common fungi, the following were recently collected: *Polystictus Lindheimeri* B. & C., *Stereum Leveillianum* Fr., *Schizophyllum commune* Fr., *Lenzites protractus* Fr., and *Stereum albobadium* Schw.

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EXPLANATION OF PLATE

PLATE 6

Disease of the mesquite due to *Polyporus texanus*

FIG. 1. View showing the manner in which a group of sporophores of *Polyporus texanus* grows on the trunk; also the lower surfaces of the sporophores.

FIG. 2. Two sections of diseased mesquite trunk showing the manner in which the wood is destroyed.

FIG. 1.

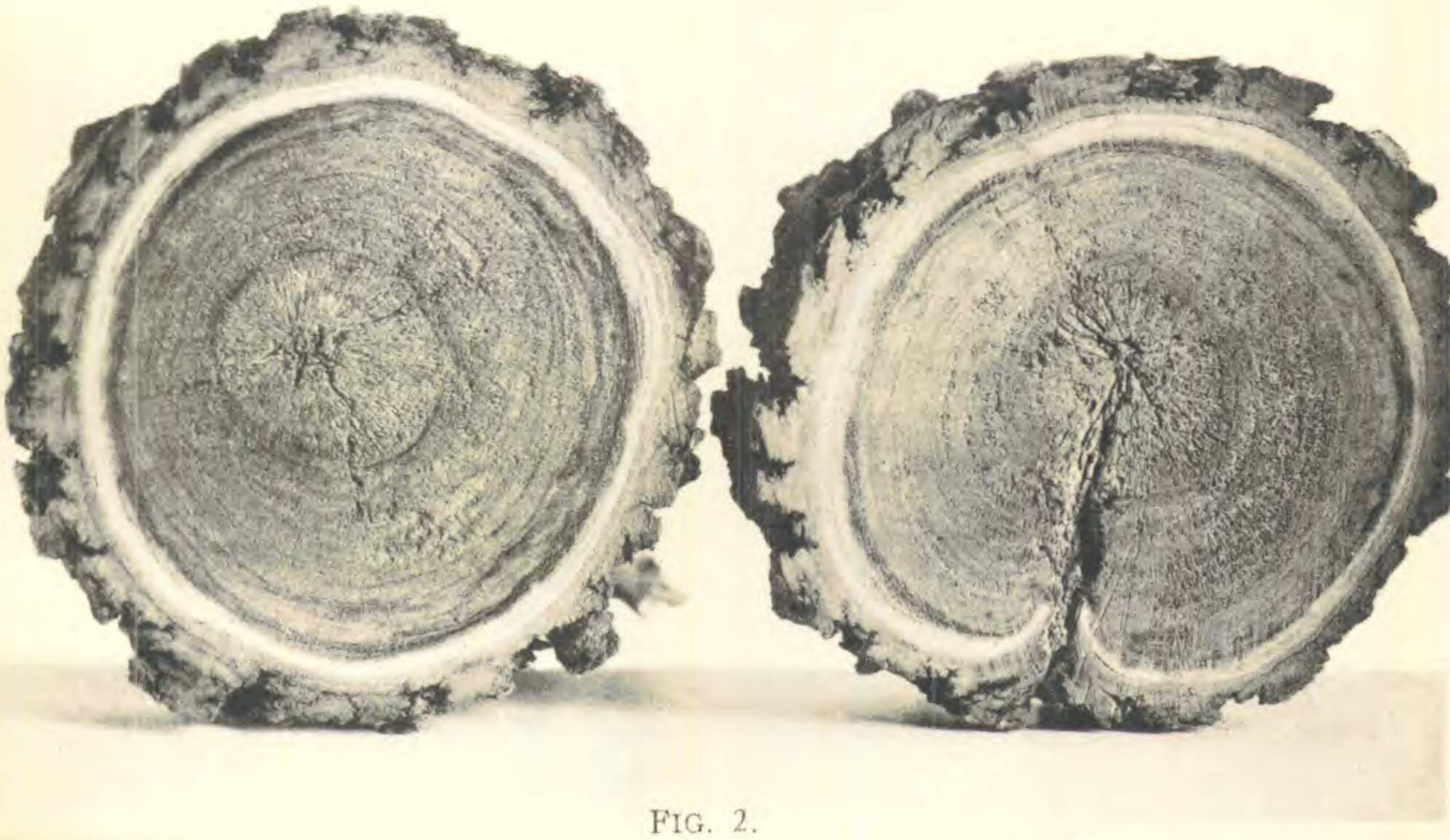

FIG. 2.

VON SCHRENK — TRUNK DISEASES OF MESQUITE

COCKAYNE, BOSTON.

Explanation of Plate

PLATE 7

Disease of the mesquite due to *Polyporus texanus*

Fig. 1. Side view of a group of sporophores of *Polyporus texanus* growing on a living mesquite tree.

Fig. 2. Front view of a group of sporophores of *Polyporus texanus* growing on a living mesquite tree.

FIG. 1.

FIG. 2.

VON SCHRENK — TRUNK DISEASES OF MESQUITE

COCKAYNE, BOSTON.